The influence of land management on small streams at Ft. Benning Georgia?

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Effects of Landscape Disturbance on Streams

Disturbance

Sediment, Organic Matter, Nutrient Runoff

Altered Abundance & Diversity

Biota

Altered Functional Organization

Selective Harvest

Hugh Westbury

Roads

Jeff Houser

Controlled Burn

Hugh Westbury

Controlled Burn

Hugh Westbu

M1 Abrams
Danny Johns

Impact Zone
Danny Johns

Ephemeral Channel
Danny Johns

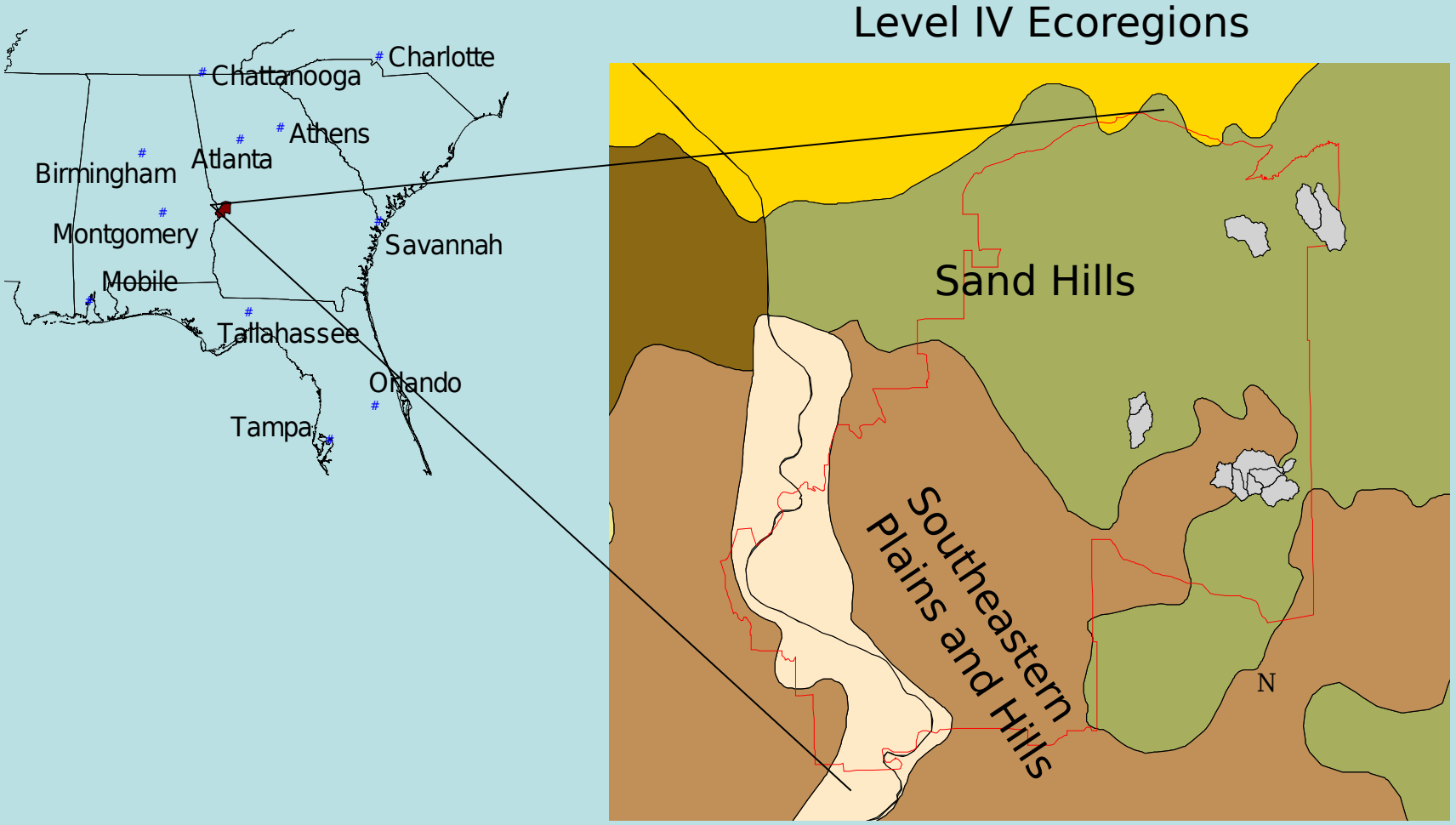
Ephemeral Channel
Danny John

Road “Blow-out”

Overland Flow
Danny Johns

Danny Johns

Study Site – Fort Benning Military Reservation, Georgia



Objectives

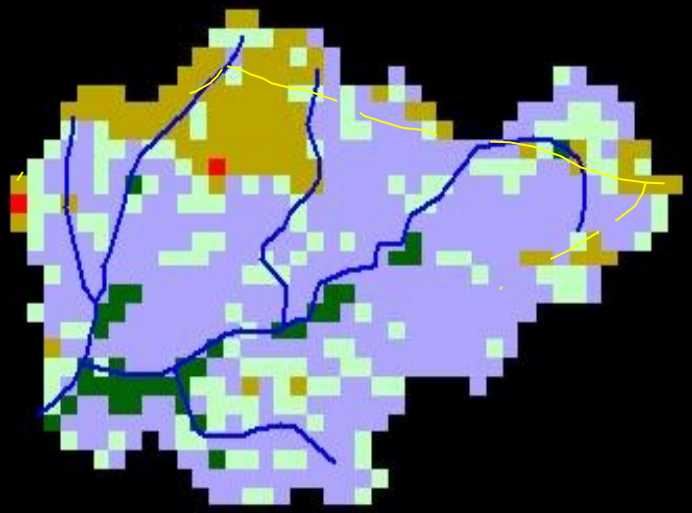
- Quantify landscape disturbance at the watershed scale.
- Relate landscape disturbance with stream physical structure and biotic communities.
- Restoration of in-stream and riparian conditions and follow-up monitoring.

Methods

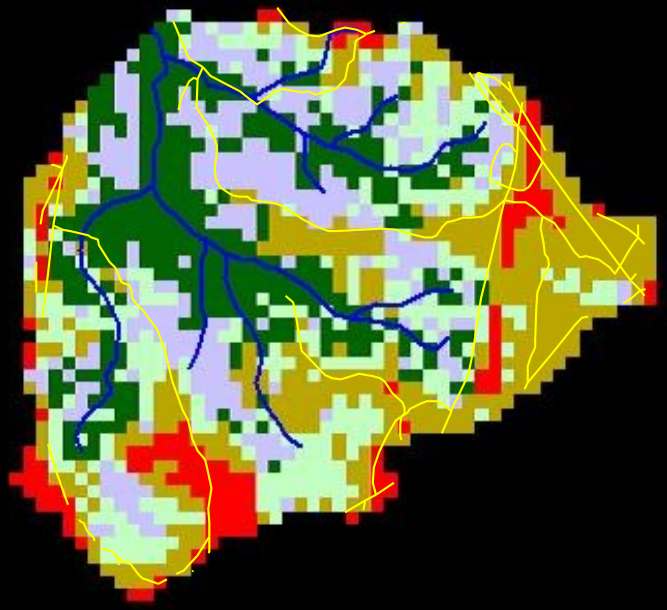
Quantified landscape disturbance – GIS/Landsat imagery

Disturbance Intensity (DI) - % watershed that is Bare Gro opes > 3% and under Roads

Low



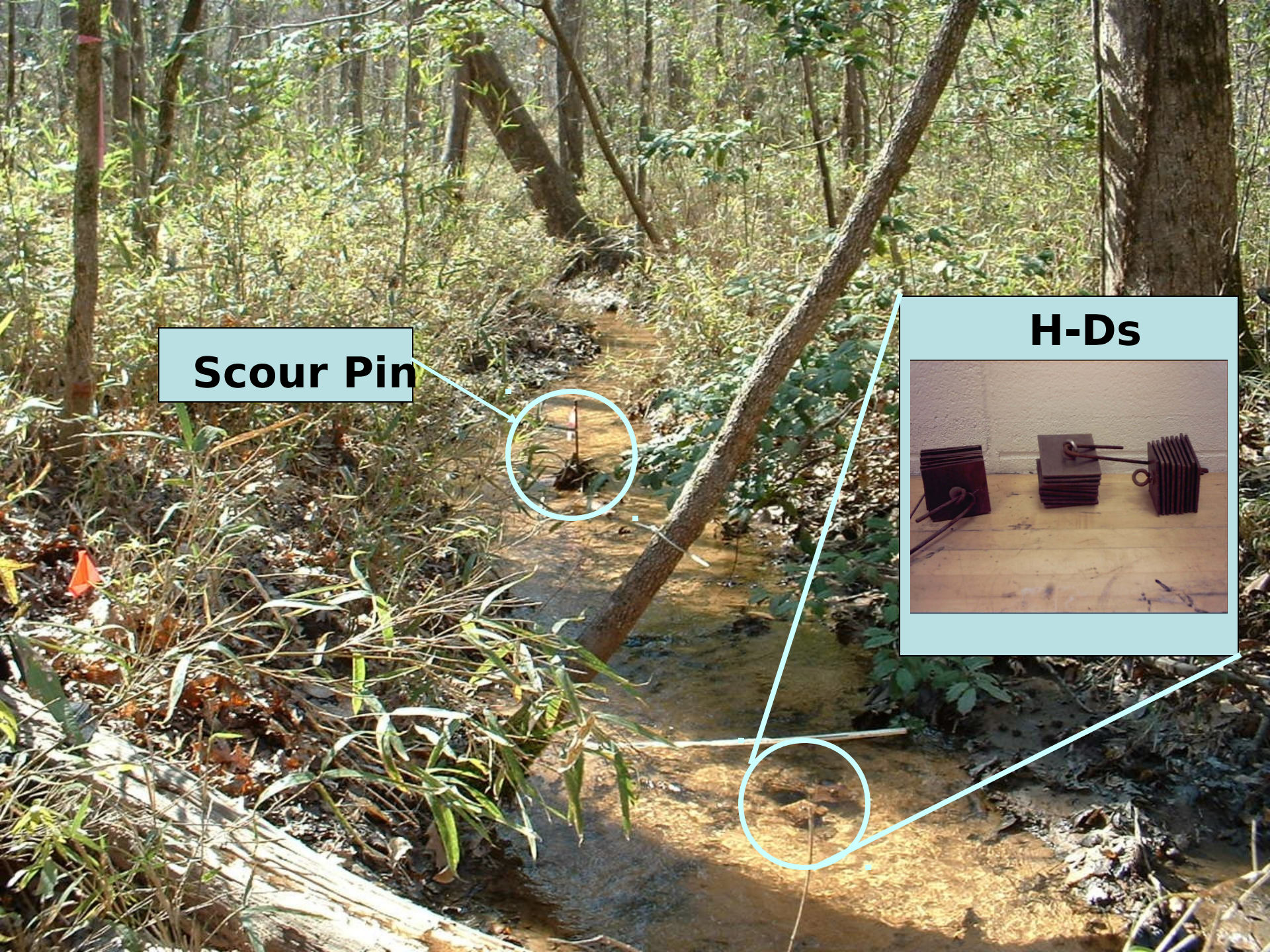
High

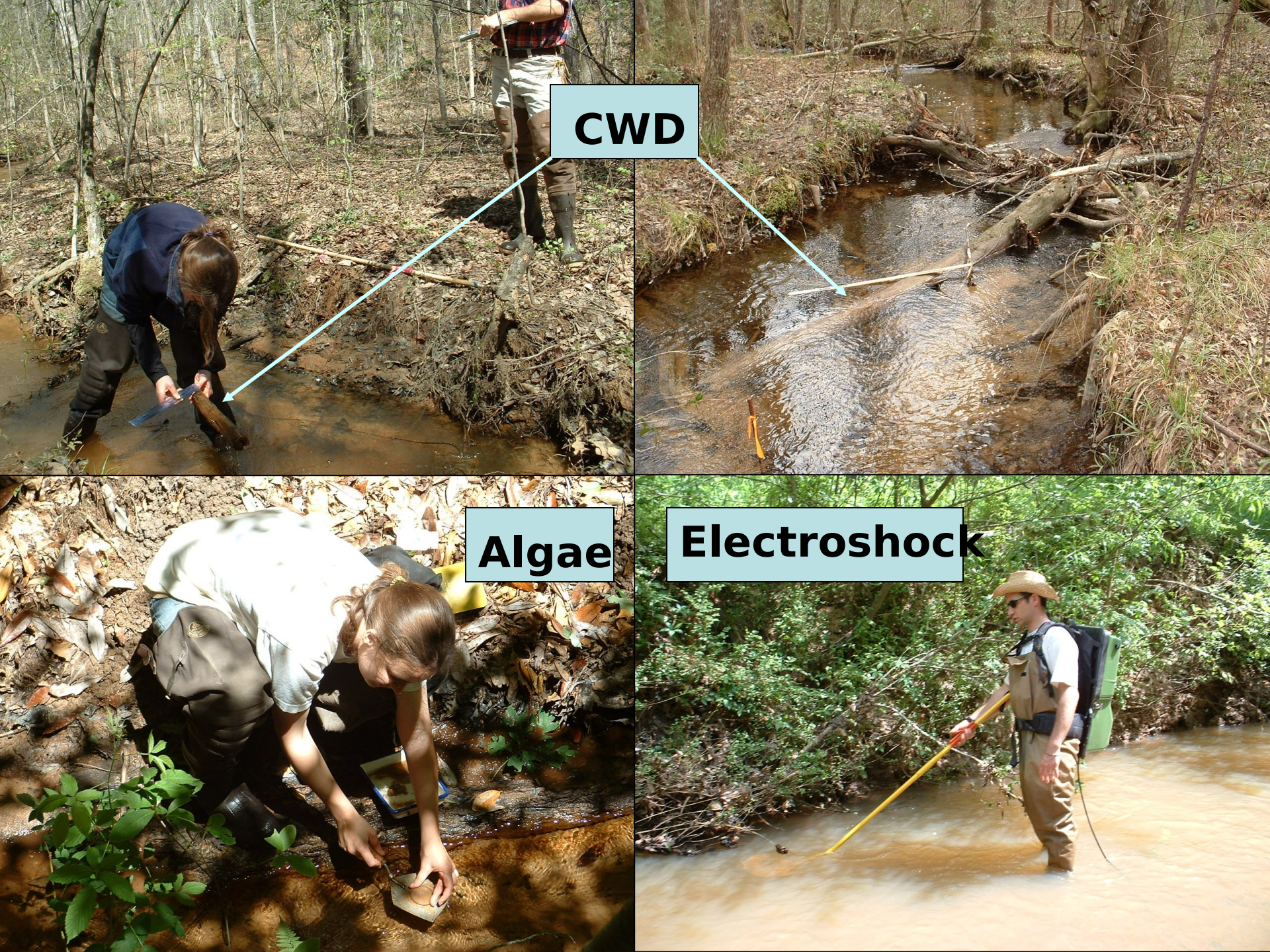


Methods

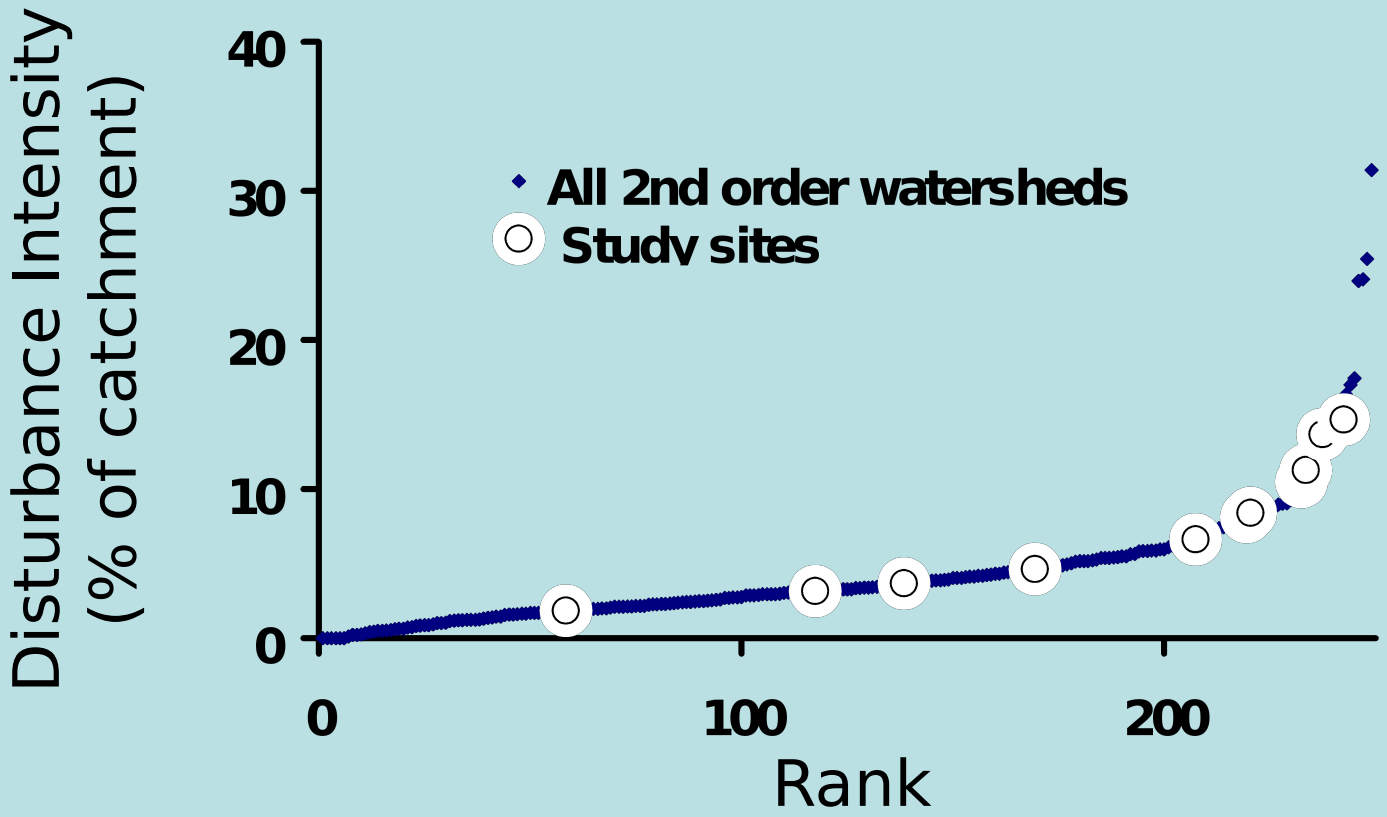
- Physical structure / Habitat:
  Streambed stability
  Streambed organic matter
  Coarse woody debris

- Stream Biota:
  Algae
  Macroinvertebrates
  Fish & Crayfish

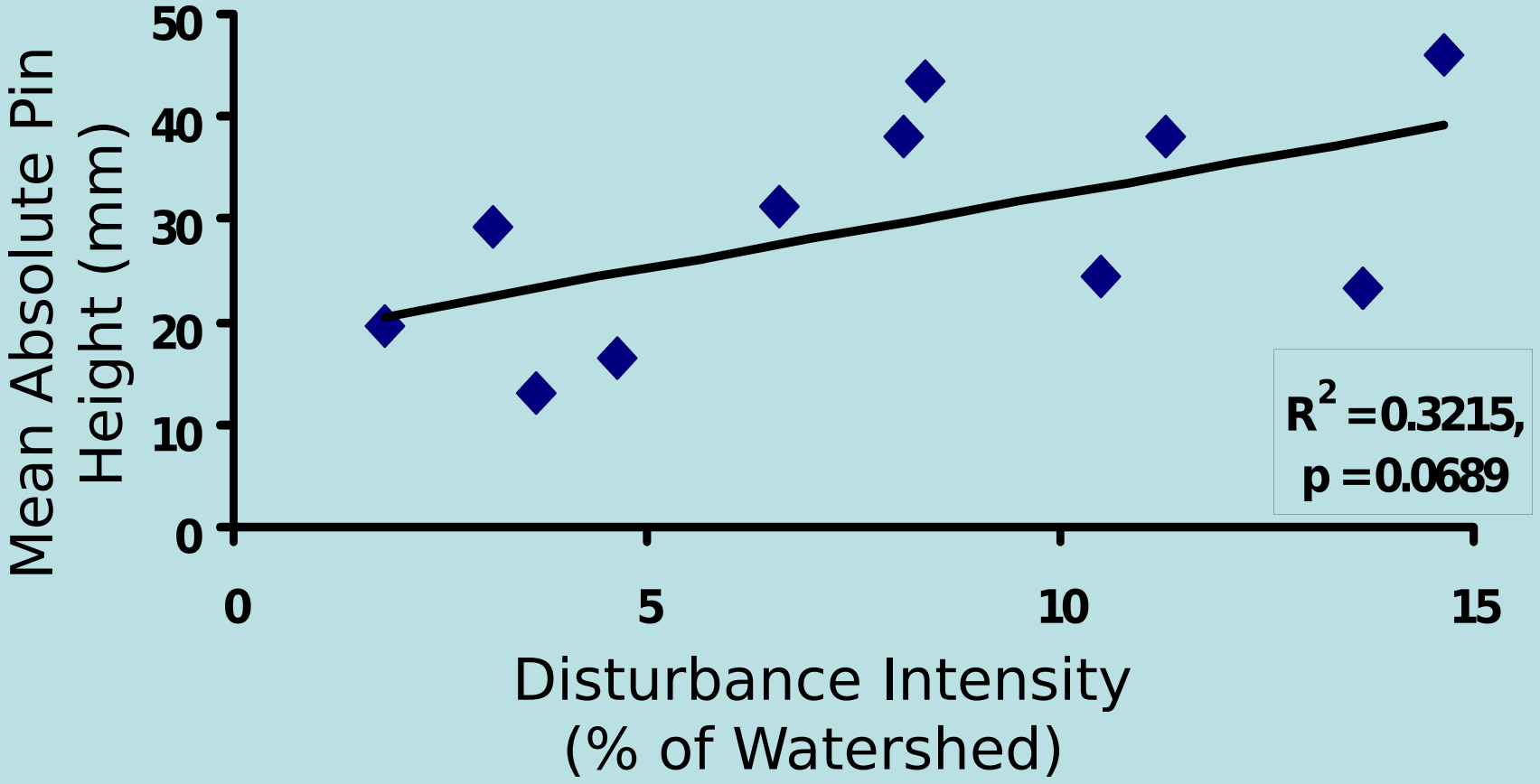

Scour Pin
H-Ds


CWD
Algae
Electroshock

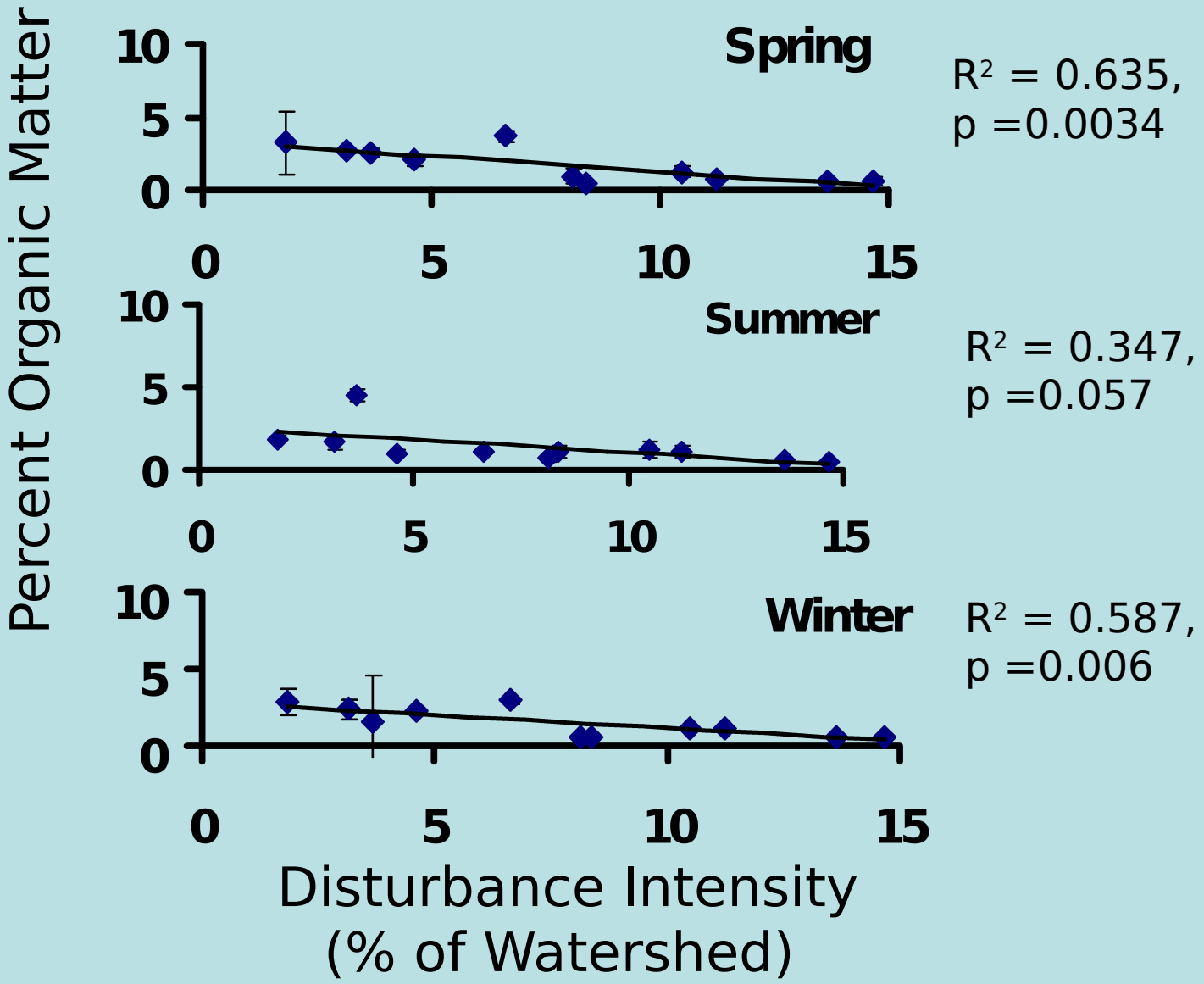
Disturbance Intensity of Study Sites



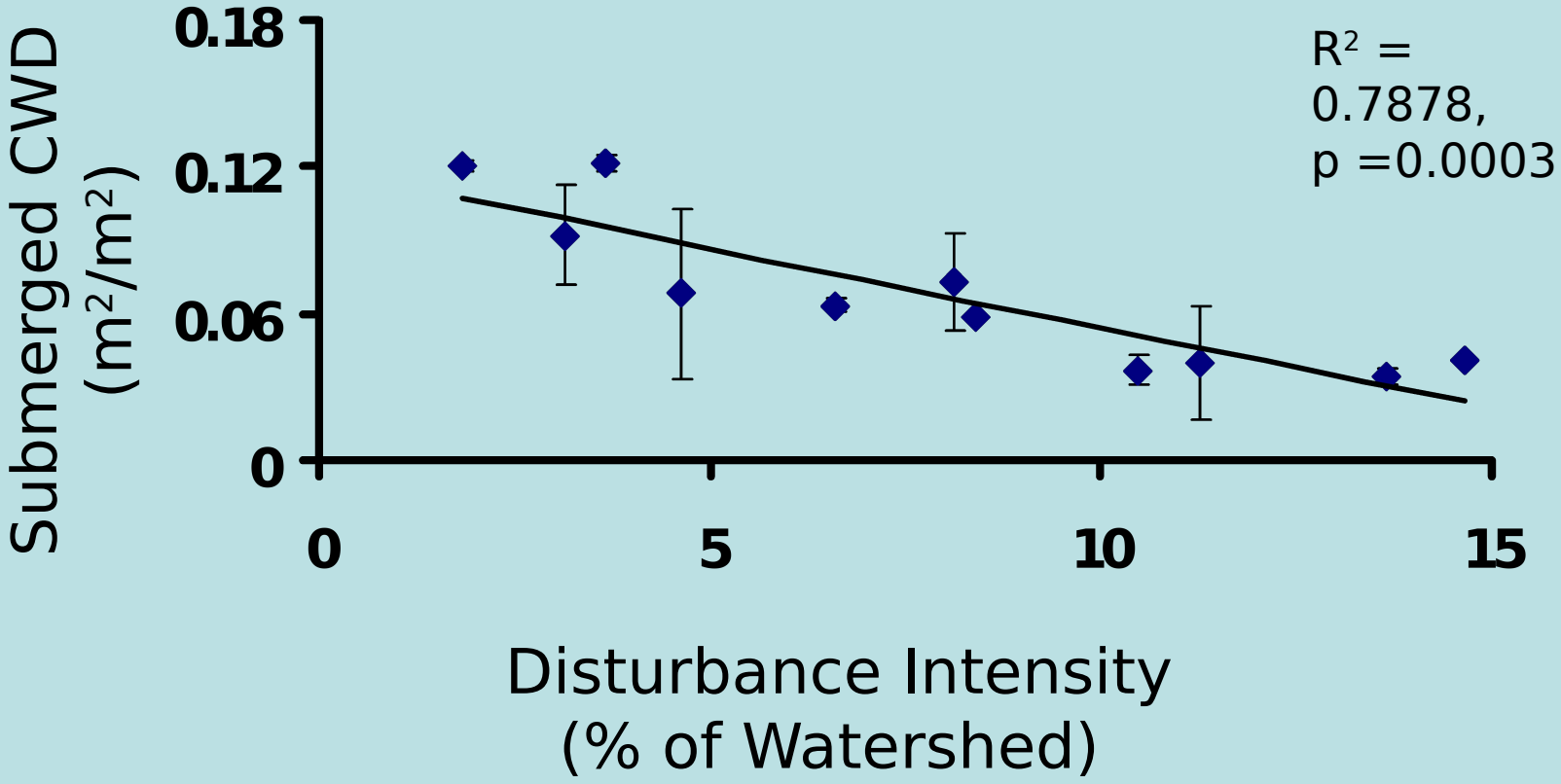
Streambed Stability



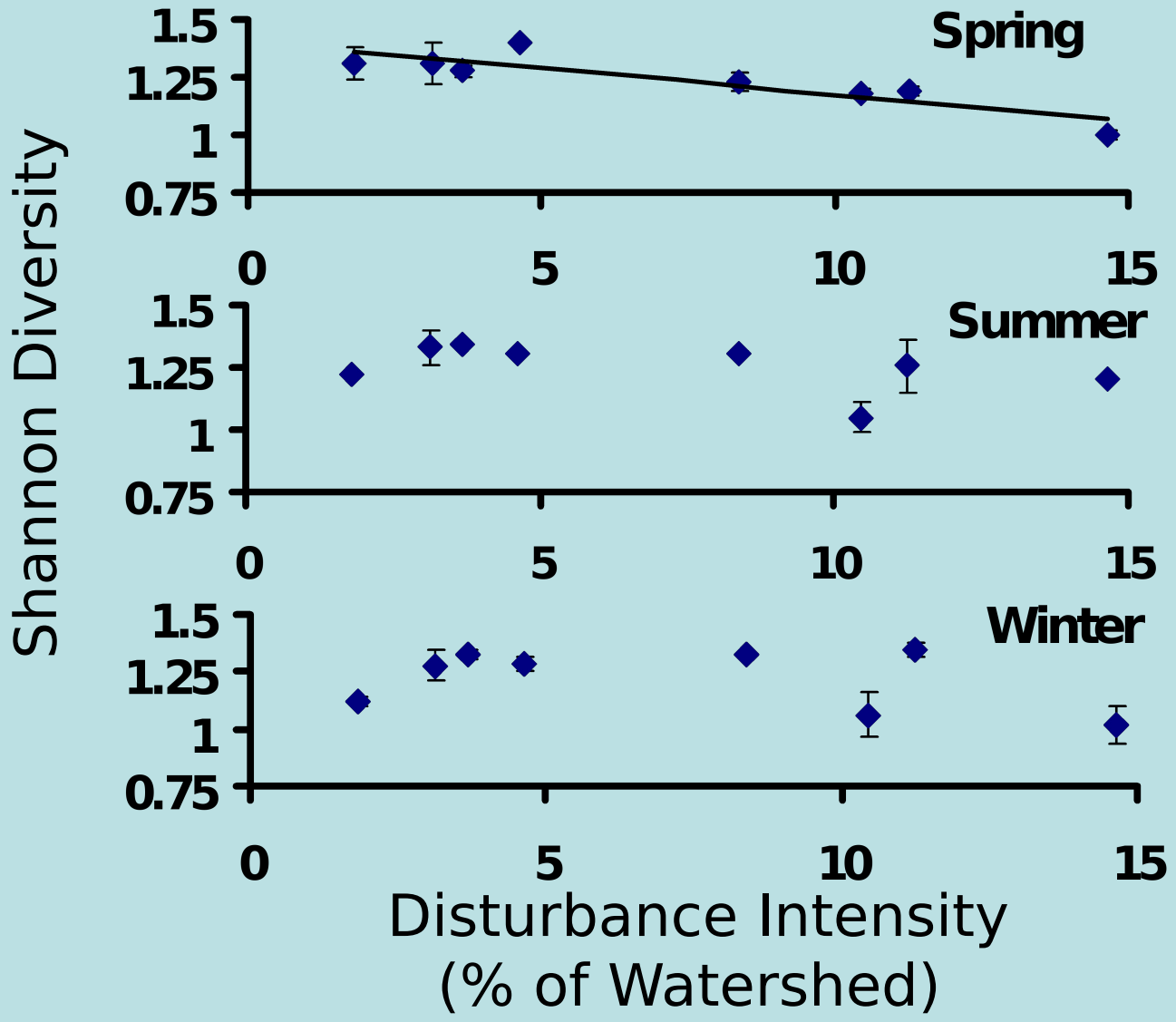
Streambed Organic Matter



Submerged CWD



Macroinvertebrate Diversity

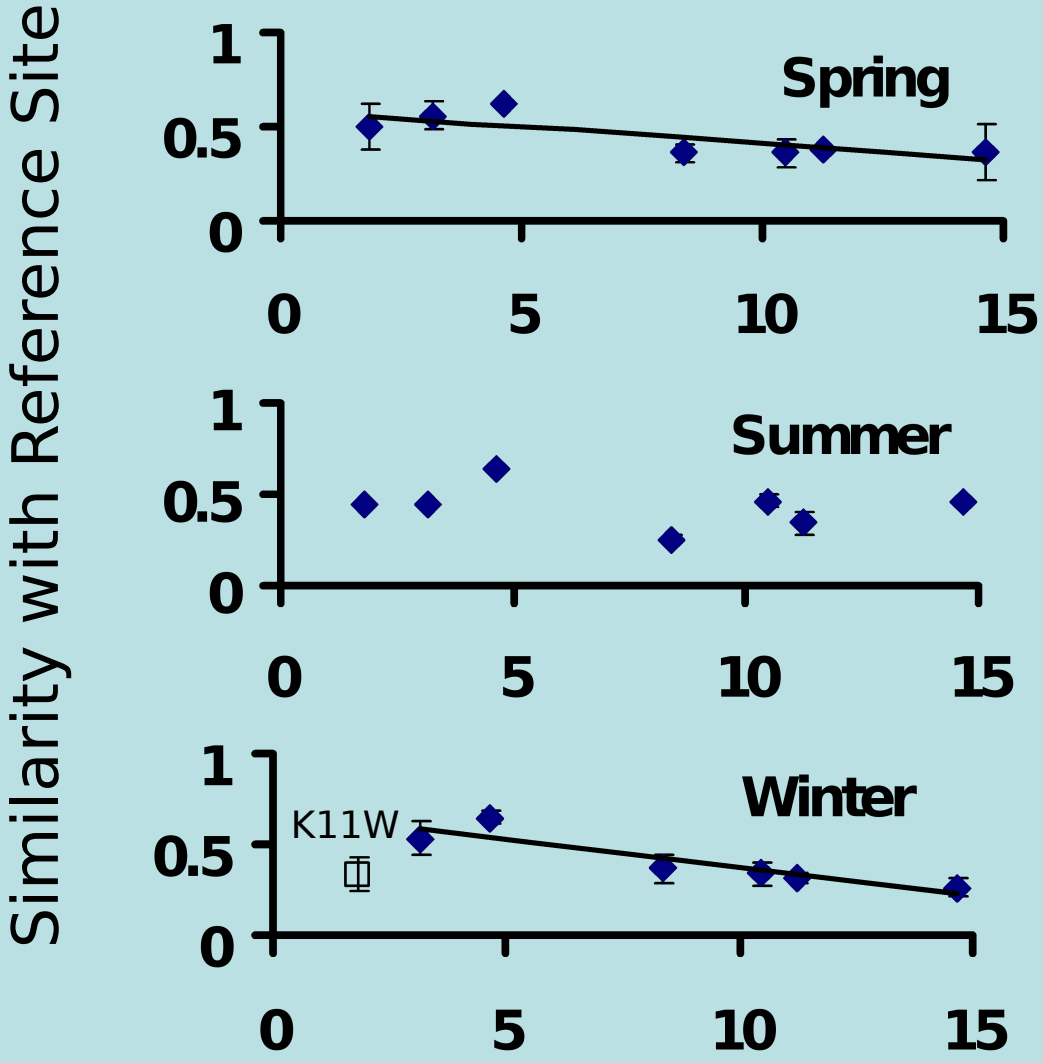


$R^2 = 0.773$,
$p = 0.004$

n.s.

n.s.

Bray-Curtis Similarity



$R^2 = 0.624$,
$p = 0.035$

n. s.

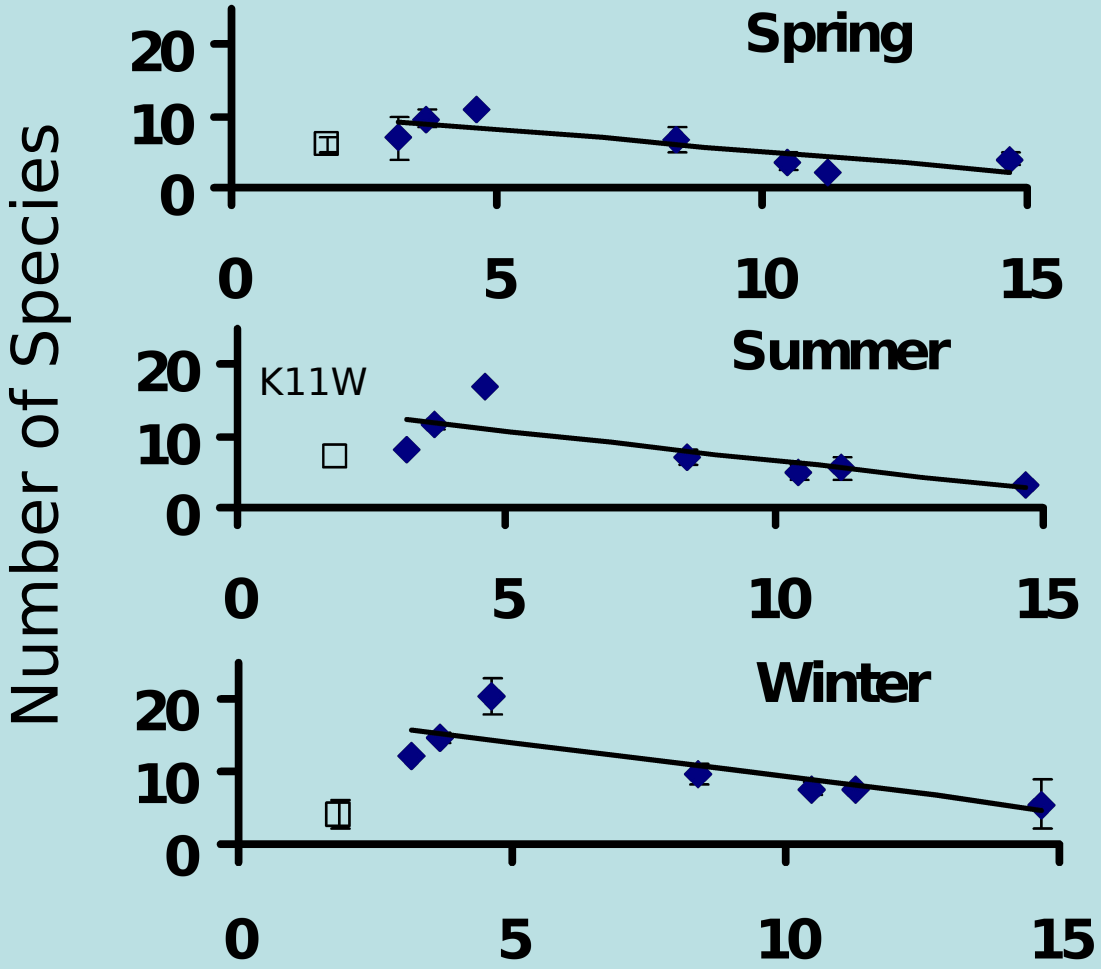
$R^2 = 0.813$,
$p = 0.014$

Ephemeroptera

Plecoptera

Trichoptera

Number of EPT Species

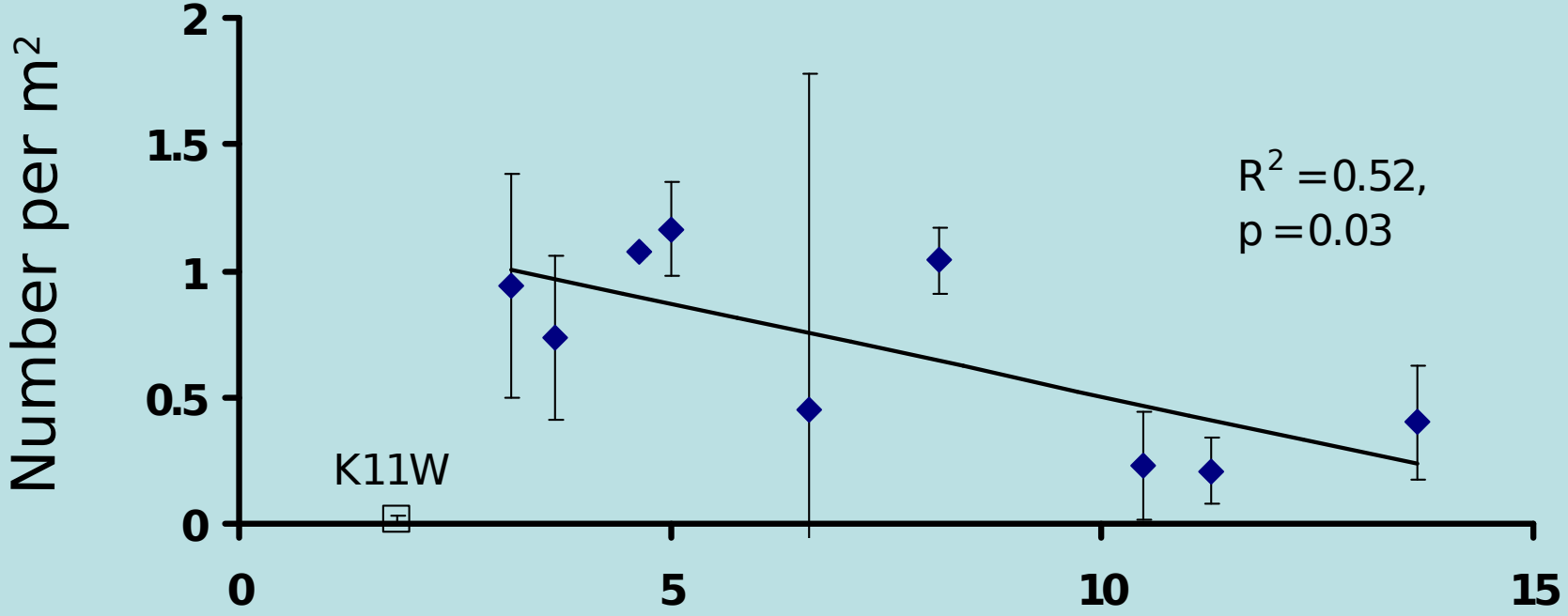


$R^2 = 0.65$,
$p = 0.029$

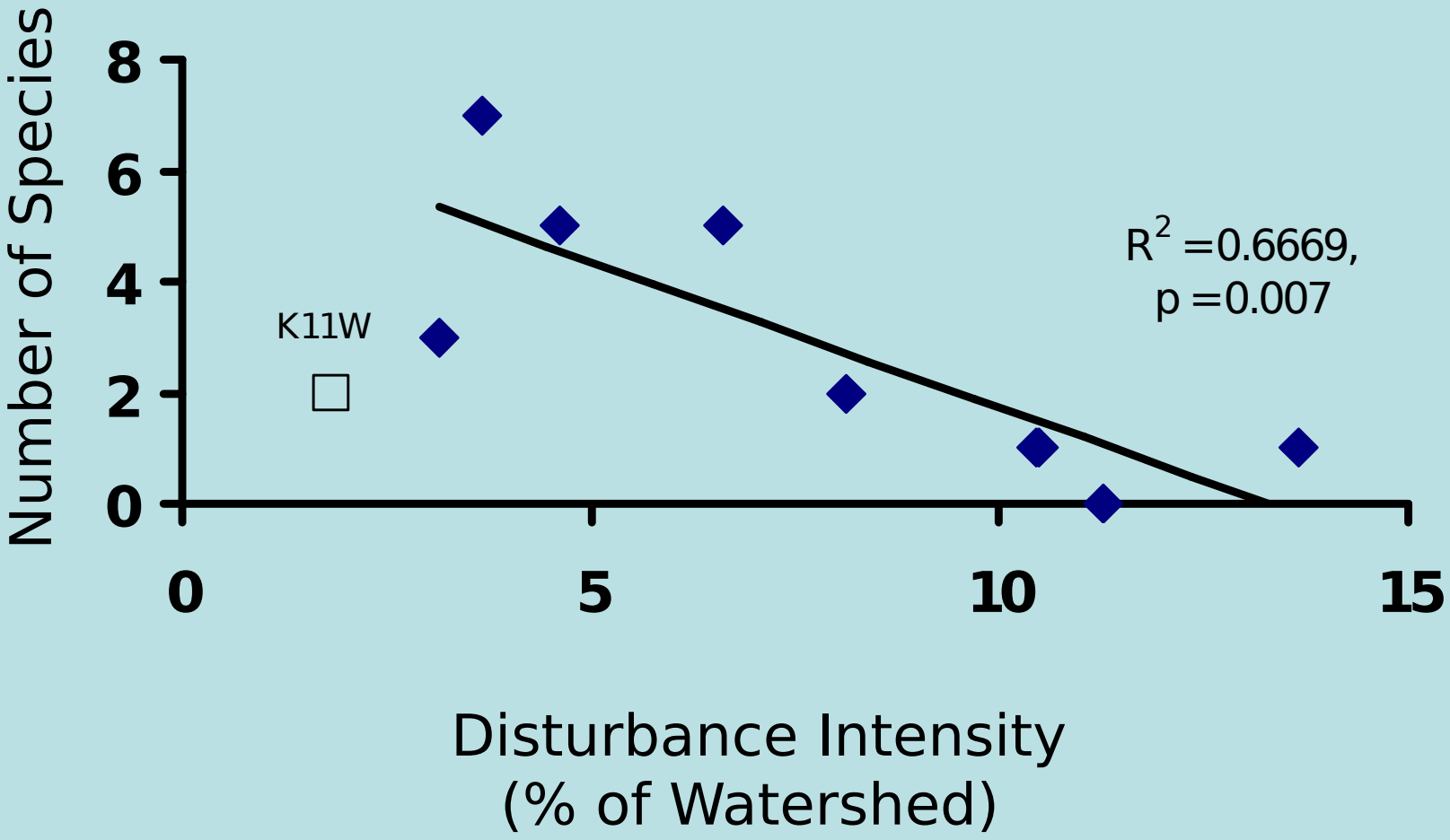
$R^2 = 0.582$,
$p = 0.046$

$R^2 = 0.651$,
$p = 0.028$

Density of *Procambarus versutus*



Number of Fish Species



Summary

- Land use patterns were indicated by both the abiotic and biotic components of the stream.

- Landscape disturbance decreased :
  - Streambed stability
  - Streambed % organic matter
  - Submerged CWD
  - Macroinvertebrate diversity,similarity to a reference stream, and number of EPT taxa
  - Density of the dominant crayfish *P. versutus*
  - Number of fish species

Future Work

- Test existing metrics (e. g. NCBI, GA Index)
- Experimental manipulation of watershed (May 2003)

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